

CLAIMS

1. (Currently Amended) An optical device, comprising:

a first optical transmitter emitting a first optical signal having a first wavelength;

a second optical transmitter emitting a second optical signal having a second wavelength different than said first wavelength, said second wavelength being variable among a plurality of second wavelengths;

an optical combining element configured to combine said first and second optical signals onto a common optical communication path;

an optical filtering element coupled to said optical communication path, said optical filtering element having an associated transmission spectrum having a plurality of transmission peaks, each of which corresponding to a respective one of said plurality of second wavelengths; and

a receiver circuit coupled to said optical filtering element, said receiver circuit being configured to sense said second optical signal.

2. (Original) An optical device in accordance with claim 1, wherein said optical filtering element includes a Fabry-Perot etalon.

3. (Original) An optical device in accordance with claim 1, wherein said optical combining element includes an optical coupler.

4. (Original) An optical device in accordance with claim 1, wherein said optical combining element includes an optical filter.

5. (Original) An optical device in accordance with claim 1, wherein said plurality of peaks are periodically spaced within said transmission spectrum.

6. (Original) An optical device in accordance with claim 1, wherein said optical filtering element is a first optical filtering element, said optical device further comprising a second optical filtering element coupled to said second optical transmitter and said optical combining element, said second optical filtering element having an associated transmission spectrum substantially the same as said transmission spectrum associated with said first optical filtering element.

7. (Original) An optical device in accordance with claim 6, wherein said second optical filtering element includes a Fabry-Perot etalon.

8. (Currently Amended) An optical device in accordance with claim 1, wherein said combining element is a first combining element, ~~and said plurality of wavelengths is a first plurality of wavelengths,~~ said optical device further comprising:

a plurality of first optical transmitters, each of which emitting a corresponding one of a plurality of optical signals, each of said plurality of optical signals having a corresponding one of a ~~second~~ first plurality of wavelengths, said first optical transmitter being included in said plurality of first optical transmitters and said first optical signal being included in said plurality of optical signals;

a second combining element having a plurality of inputs, each of which being configured to receive a respective one of said plurality of optical signals, and an output configured to supply said plurality of optical signals onto said optical communication path; and

an optical demultiplexer coupled to said optical communication path, said optical demultiplexer having an input configured to receive said plurality of optical signals, and a

plurality of outputs, each of which being configured to output a respective one of said plurality of optical signals.

9. (Currently Amended) An optical device in accordance with claim 8, wherein each of said ~~second~~ first plurality of wavelengths conforms to a channel plan, each of said ~~first~~ second plurality of wavelengths being between adjacent ones of said ~~second~~ first plurality of wavelengths in said channel plan.

10. (Original) An optical device in accordance with claim 1, further comprising a plurality of optical amplifiers coupled along said optical communication path.

11. (Original) An optical device in accordance with claim 10, wherein each of said optical amplifiers includes an erbium doped fiber amplifier.

12. (Original) An optical device in accordance with claim 1, wherein said second transmitter includes an external modulator.

13. (Currently Amended) An optical device in accordance with claim 12, ~~wherein said plurality of wavelengths is a first plurality of wavelengths, said optical device~~ further comprising a plurality of first optical transmitters, each of which

emitting a corresponding one of a plurality of first optical signals, each of said plurality of first optical signals having a corresponding one of a ~~second~~ first plurality of wavelengths, said first optical transmitter being included in said plurality of first optical transmitters and said first optical signal being included in said plurality of first optical signals, said external modulator being configured to be modulated at a frequency substantially equal to a magnitude of a spectral spacing between adjacent ones of said ~~second~~ first plurality of wavelengths.

14. (Original) An optical device in accordance with claim 1, further comprising a forward error correction encoder circuit coupled to said second transmitter, and a forward error correction decoder coupled to said receiver circuit.

15. (Original) An optical device in accordance with claim 1, wherein a modulation format associated with said second optical signal is optical CDMA.

16. (Currently Amended) An optical device in accordance with claim 1, wherein said filtering element is a first filtering element, said optical device further comprising:

a second filtering element coupled to said first filtering element, said second filtering element has a first output configured to supply said second optical signal when said second optical signal having a first one of said plurality of second wavelengths, and a second output configured to supply said second optical signal when said second optical signal having a second one of said plurality of second wavelengths different than said first one.

17. (Currently Amended) An optical device in accordance with claim 16, wherein said second optical signal includes a plurality of pulses, each at a respective one of said plurality of wavelengths, further comprising:

a first detector coupled to said first output of said second filtering element, said first detector generating a first sense signal in response to said second optical signal having said first one of said plurality of second wavelengths;

a second detector coupled to said second output of said second filtering element, said second detector generating a second sense signal in response to said second optical signal having said second one of said plurality of second wavelengths different than said first one; and

a counter circuit coupled to said first and second detectors, said counter circuit initiating a count of said

plurality of pulses in response to said first sense signal, and assigning a respective one of said plurality of wavelengths to each count.

18. (Original) An optical device in accordance with claim 16, wherein said second filtering element includes a fiber Bragg grating.

19. (Currently Amended) An optical device, comprising:

a first optical transmitter emitting a first optical signal having a first wavelength;

a second optical transmitter emitting a second optical signal having a second wavelength different than said first wavelength, said second wavelength being variable among a plurality of second wavelengths;

an optical combining element configured to combine said first and second optical signals onto a common optical communication path; and

an optical filtering element coupled to said optical communication path, said optical filtering element having an associated transmission spectrum having a plurality of transmission peaks, each of which corresponding to a respective one of said plurality of second wavelengths.

20. (Original) An optical device in accordance with claim 19, wherein said optical filtering element is coupled to said optical combining element and said second optical transmitter.

21. (Original) An optical device in accordance with claim 19, wherein a modulation frequency associated with said second optical signal is greater than an optical frequency associated with said first optical signal, said optical device further comprising:

a detector coupled to said optical communication path; and
a low pass filter coupled to said detector.

22. (New) An optical device in accordance with claim 8, the transmission spectrum of said optical filtering element having a plurality of transmission minimas substantially overlapping with the first plurality of wavelengths.

23. (New) An apparatus for monitoring a wavelength division multiplexed optical transmission system having a plurality of data transmitters each transmitting a respective data signal at a distinct data wavelength over an optical communication path, comprising:

a monitoring signal transmitter optically coupled to the optical communication path, said monitoring signal transmitter

including a tunable laser generating a tunable monitoring wavelength carrying a monitor signal via modulation, wherein the monitoring wavelength is tunable among a plurality of monitoring wavelengths;

an optical combiner combining the tunable monitoring wavelength and the distinct data wavelengths; and

an optical filter optically coupled to said monitoring signal transmitter and to the optical communication path, said optical filter having a plurality of transmission maxima corresponding to the monitoring wavelengths and a plurality of transmission minima corresponding to the data wavelengths.

24. (New) the apparatus in accordance with claim 23, wherein the data wavelengths and the monitoring wavelengths are mutually distinct wavelengths.

25. (New) The apparatus in accordance with claim 23, wherein each of the monitoring wavelengths are between respective pairs of the data wavelengths.

26. (New) The apparatus in accordance with claim 23, further comprising:

a controller operatively connected to said monitoring signal transmitter, said controller generating control signals

causing the tunable laser to change the monitoring wavelength in a step-wise fashion.

27. (New) The apparatus in accordance with claim 26, wherein each of the monitoring wavelengths are substantially midway between respective pairs of the data wavelengths.

28. (New) The apparatus in accordance with claim 27, wherein the step-wise changes to the monitoring wavelength have a channel-spacing step-size.

29. (New) The apparatus in accordance with claim 23, further comprising:

a second optical filter optically coupled to the optical communication path, said second optical filter having a plurality of transmission maxima corresponding to the monitoring wavelengths and a plurality of transmission minima corresponding to the data wavelengths; and

a receiver circuit optically coupled to said second optical filter, said receiver circuit being configured to sense the monitor signal.